

First record of *Gobius couchi* (Gobiidae) in the Ionian Sea

by

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RÉSUMÉ. - Premier signalement du gobie *Gobius couchi* (Gobiidae) en mer Ionienne.

Trois exemplaires du gobie *Gobius couchi* Miller & El-Tawil, 1974, récemment retrouvés dans la collection ichthyologique du Musée national de Prague, représentent le premier signalement de l'espèce en mer Ionienne et en Grèce, et un des rares en Méditerranée. L'analyse du gène du cytochrome b a confirmé l'identification de l'espèce.

Key words. - Gobiidae - *Gobius couchi* - MED - Ionian Sea - New records - Morphology - DNA identification.

Distribution of many gobiid species in European waters is still inadequately known. Especially smaller species with cryptic behavior or species morphologically similar to common species often escape to attention. This is the case of *Gobius couchi* Miller & El-Tawil, 1974, which occurs in relatively large geographic area, from British Isles to eastern Mediterranean (Fig. 1). However, the known localities of its occurrence are extremely scattered throughout this area, with only three records in the Mediterranean up to date (Kovačić and Golani, 2007). Three specimens of *G. couchi*, recently found in the ichthyological collection of the National Museum, Prague, were identified using morphological and DNA analyses. This represents the first record of the species in the Ionian Sea and Greece.

MATERIAL AND METHODS

Material. - Three juveniles of unidentified sex, 20.0 + 4.4 mm (Fig. 2), 19.5 + 5.0 mm and 15.6 + 4.1 mm, NMP P6d 96/2008, Moraitika (N 39°28'25", E 19°55'53"), Corfu Island, Greece (Fig. 1), 13 Jul. 2004, leg. R. Šanda.

Comparative material of *G. couchi* for DNA analysis. - Six females, 31.0 + 8.1 mm to 36.0 + 8.2 mm, and 4 males, 31.5 + 7.9 mm to 43.6 + 9.4 mm, PMR VP1878, Krk, Rijeka Bay, Croatia, 19 Feb. 2008, leg. M. Kovačić; 1 juvenile, 27.0 + 6.5 mm, NMP P6p 84/2007, Oštro, Rijeka Bay, Croatia, 29 Oct. 2007, leg. M. Kovačić.

Meristic methods follow Miller (1988).

Meristic abbreviations. - A, anal fin; C, caudal fin; D, dorsal fins; P, pectoral fin; V, pelvic disc; LL, scales in lateral series; TR, scales in transverse series. V emargination is the difference between the longest branches of fourth branched rays and the shortest branches of fifth branched rays. Terminology of lateral-line system follows Sanzo (1911) and Miller (1986).

DNA was extracted from fin tissue of three specimens of *G. couchi* from Corfu and from 10 specimens from the Northern Adriatic using JETQUICK Tissue DNA Spin Kit (Genomed), following manufacturer instructions. Mitochondrial gene for cytochrome b



Figure 1. - Map of Europe showing the known records of *Gobius couchi* and a detail map of the eastern part of the Ionian Sea with arrow showing locality of the new record of *Gobius couchi* from the Corfu Island. [Carte d'Europe présentant les signalements connus du gobie *G. couchi* et la carte détaillée de l'Est de la mer Ionienne avec la flèche indiquant le signalement récent du gobie *G. couchi* de Corfou.]



Figure 2. - *Gobius couchi*, juvenile of unidentified sex, 20.0 + 4.4 mm, NMP P6d 96/2008, Moraitika, Corfu Island, Greece, 13 Jul. 2004, leg. R. Šanda. Scale = 5 mm.

was amplified using the primers GluF and ThrR (Machordom and Doadrio, 2001). The PCR mixture and amplification protocol was the same as used by Machordom and Doadrio (2001). Sequencing was carried out by the Macrogen (Seoul, South Korea) with the use of amplification primers. Sequences were aligned manually, revised in BioEdit (v.5.0.9) and deposited in the GenBank under accession numbers FJ389190-FJ389196. Abbreviations of institutions: NMP - National Museum, Prague; PMR - Prirodoslovni muzej Rijeka.

RESULTS

Diagnosis. - (1) suborbital papillae of lateral-line system without longitudinal row *a*; (2) all three head canals present; (3) predor-

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sal area scaled in the specimens 20.0 + 4.4 mm and 19.5 + 5.0 mm, scales not visible in the specimen 15.6 + 4.1 mm; (4) 6 suborbital transversal rows, but a single papilla visible near pore α ; (5) anterior oculoscapular canal with pore α at rear of orbit; (6) oculoscapular row x^l not extending forwards to pore β , row x^l not clearly visible in specimen 15.6 + 4.1 mm; (7) LL on both sides 38-41; (8) row d divided below row 3 or below row 3 and 4; (9) V emarginated up to about 1/8 of the length; (8) P 16-17.

Description. - Anterior nostril without triangular lappet. Fins: D1 VI, D2 I/13, A I/12-13 (12:2, 13:1), C too damaged for counting branched rays or check of shape, P on the left side (right P fin cut for DNA analysis before morphological examination) 16-17 (16: 2, 17: 1), V I/5+5/I. Free tips on P rays not visible. V emarginate 86-93% of the length. Anterior membrane height in midline 1/5 length of V spinous ray for the specimen 19.5 + 5.0 mm, other two specimens with damaged anterior membrane. Body with ctenoid scales, LL 38-41 (both sides: 38: 1, 39: 1, 40: 2, 41: 2), TR 11-12 (both sides: 11: 3, 12: 3). Scales on breast present posteriorly (the specimen 19.5 + 5.0 mm) or not visible (other two specimens), opercle and cheek naked, predorsal area scaled, except the specimen 15.6 + 4.1 mm, which is without visible scales. Preserved specimens were light brown with reticulate pattern, formed by pigmentation along the margins of most scales. The most distinct marks were nine darker blotches along lateral midline. Two bigger specimens with one spot on cheek and two more or less defined dark stripes from eye, one ending downwards on the angle of jaws, the other on the upper lip, with pale area between the stripes. The smallest specimen with several spots on cheek instead of clear stripes. Longitudinally arranged three gular spots and fourth on the bottom of the opercle. P with dark mark in upper fin origin, deeper than long, another one nearby, on axilla; V pale; rows of dots on D1, D2 and C; A pigmented, in the smallest specimen A base more intensively pigmented than A fin itself. Head with anterior and posterior oculoscapular, and preopercular canals, with pores σ , λ , π , ω , α , β , ϱ , ϱ^1 , ϱ^2 , and γ , δ , ϵ , respectively. Rows: six transverse suborbital rows (1-6) of sensory papillae and a single papilla near pore α ; rows 2 and 3 begin more distant from orbit than row 4 in the specimen 19.5 + 5.0 mm; in other two specimens, all transverse suborbital rows begin at the more or less same distance from the orbit. Suborbital row $6i$ ending downwards more or less in the level of row d . Longitudinal row b extending forwards to row 5. Longitudinal row d divided below suborbital row 3 or in the specimen 19.5 + 5.0 mm below suborbital row 3 and 4. Oculoscapular anterior longitudinal row x^l ending anteriorly behind pore β , except in the smallest specimen where oculoscapular rows were not clearly visible. Anterior dorsal rows were too poorly visible in all specimens to be able to check position of rows g and o .

Comparison of mitochondrial DNA gene cytochrome b (1140 bp) of *G. couchi* specimens from Corfu and from the Northern Adriatic shows almost identical haplotypes, differing maximally in two mutations. Altogether seven haplotypes were identified, one of which shared in specimens from both areas, four haplotypes unique for the northern Adriatic specimens and two for the Corfu specimens. Such low genetic variability suggests that both populations belong to the same species and support the morphological identification.

All specimens were caught during snorkeling with hand net in depth 3-5 m under small stones scattered on sandy bottom.

DISCUSSION

Careful check of material from scientific collections can reveal

presence of rare species (Kovačić and Golani, 2007). In this case, a redetermination of gobies from NMP revealed the first record of *G. couchi* for the Ionian Sea and Greece. This species has been known from a few localities around the British Isles (Miller and El-Tawil, 1974; Minchin, 1988), from the Tyrrhenian Sea (Stefanni and Mazzoldi, 1999), the Adriatic Sea (Kovačić, 2001) and the eastern Levant Sea (Kovačić and Golani 2007), see Fig.1. The morphological characteristics agree with the species diagnosis. However, the smallest specimen (15.6 + 4.1 mm) has no visible scales on the predorsal area and row x^l is not clearly visible. In addition, all specimens differ in some morphological characters from the species description (Miller and El-Tawil, 1974), and some characters are not clearly visible to confirm character state.

Specimens of *G. couchi* from the northern Adriatic and those from Corfu have almost identical haplotypes of cytochrome b, which confirms conspecific status of these two distant populations. Cytochrome b could be a useful marker for identification of the Mediterranean gobies. In general, analyses of selected mitochondrial DNA fragments, together with morphological comparison, could be a useful tool for determination of rare gobiid taxa, damaged material or juvenile life stages. However, mitochondrial markers have limited ability to reveal hybridization or genetic introgression.

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